SELF-CONTAINED ISOLATION AND ENVIROMENTAL PROTECTION SYSTEM

FIELD OF THE INVENTION

The present invention relates generally to medical devices utilized to isolate and treat intensive care patients outside of a medical facility, and more particularly, to a self-contained, transportable isolation and environmental protection system utilized in the resuscitation, stabilization, and transport of medical patients that further facilitates the isolation of the trauma casualty from a contaminated environment or a contaminated patient from a clean environment.

BACKGROUND OF THE INVENTION

Typically, when a person is injured and becomes a casualty in a contaminated environment, such as occurs in a chemical warfare confrontation, the casualty is taken to a decontamination site where he is decontaminated, and thereafter transferred to a medical treatment facility. In many cases, it is imperative that medical treatment be given to the casualty immediately.

However, in order to administer treatment, the casualty must first be isolated and transported into an enclosure within which medical personnel may work on the casualty or additional means must be provided for allowing access to the casualty without introducing contaminants into the enclosure containing the casualty. In this regard, it is desirable to isolate the patient from the environment when the environment-contains substances which may be detrimental to the medical patient. For example, if the patient has suffered severe blood loss or is experiencing difficulty breathing, then it is desirable to prevent the patient from breathing dust, engine exhaust, smoke, etc. It is also desirable to isolate the medical patient from the environment when bacteriological, chemical and/or radiological hazards are present, as may occur during battlefield conditions.

In addition, it would be advantageous if such isolated environment were caused to facilitate the removal of such toxic and infectious residues that may be present on the clothing and/or skin of such isolated medical patient to thus enable the patient to become further stabilized during transit to a suitable medical facility. Ideally, the isolated medical patient would be contained within an environment that is provided with air that is constantly circulated, decontaminated and refreshed such that such toxic and infectious residues are rapidly removed from the isolated medical patient's containment area.

Alternatively, it is desirable to isolate the caregivers from the medical patient in instances where the medical patient is suspected of having a contagious disease, or has been exposed to bacteriological, chemical or radiological contamination. As such, it is desirable to provide means for isolating the patient from the environment and caregivers, as well as isolating the caregivers from the patient.

Unfortunately, prior art apparatuses currently available for isolating and treating the casualty in the field are generally ineffective in providing an environment conducive to the administration of medical treatment, and can thus cause treatment to be delayed until the casualty is transported to an adequate medical facility, which is frequently not readily accessible. Such prior art apparatuses are further generally deficient in providing an environment where the casualty is protected from contaminants, and provided with refreshed, decontaminated air that actually facilitates the removal of contaminants already present on the skin and/or clothes of the casualty, in addition to providing trauma casualty treatment.

As such, there is a need in the art for an isolation system within which a medical patient is placed at the battlefield and within which the medical patient remains isolated until a suitable medical facility can be accessed. It is further desirable to provide an isolation system that can protect a medical patient contained therewithin from an contaminated external environment such that the condition of such patient is not made worse by the ingress of poisonous substances resulting from chemical and/or biological attack, as well as other harsh and extreme weather conditions arising from rain, wind, dust, hot, cold, wet and dry climatic conditions. There is still further a need for an isolation system that is capable of delivering a constant supply of air to a patient contained therewithin wherein such air is constantly circulated, decontaminated, refreshed, and selectively attemporated, that is further capable of delivering such air in a manner that facilitates rapid removal of toxic and infectious residues present upon the patient, and subsequently filters and decontaminates the same. There is additionally a need for a medical patient isolation system that is specifically designed and configured to function integrally with conventional litters and certain life support systems utilized therewith, most notable of the latter being the Life Support for Trauma And Transport device developed by Northrop Grumman Corporation and disclosed and claimed in co-pending U.S. Pat. application Ser. No. 08/687,693.

SUMMARY OF THE INVENTION

The present invention specifically addresses and alleviates the above-mentioned deficiencies associated with the prior art. More particularly, the present invention comprises a self-contained isolation and environmental protection system for the transportation of a patient from the battlefield or a scene of an accident to a hospital. The system comprises the combination of a patient containment enclosure and environmental control system (ECS) that are designed and configured to interconnect with a conventional litter and life support system utilized therewith, and in particular Northrop Grumman's Life Support for Trauma and Transport (LSTAT), such that there is delivered to the patient a constant supply of circulated, decontaminated and refreshed air that is prevents the further contamination of the patient or caregivers while facilitating trauma treatment.

The ECS is designed and configured to take air from the surroundings, extract contaminated particles and gas from the air by filtration, and force the resultant purified air to the patient, via the containment enclosure. The ECS is further designed to attemporate the air provided to the containment enclosure, and may further include an environmental conditioning unit that conditions, namely heats, cools, and/or dehumidifies the air as may be desired. In this regard, the environment conditioning unit is preferably coupled to an environment sensor that can selectively control environmental conditions. There is further preferably provided a filter to remove biological, chemical, and radiological contamination from the breathing air, once expelled.

The containment enclosure of the ECS preferably comprises a covering positionable about the casualty or medical patient when the latter assumes a supine position upon the litter with which the system of the present invention is used. The containment enclosure comprises the combination of a first lower bag portion and a second upper bag portion that are designed and configured to mate with one another via a long zippered opening to form an airtight, an anti-leak chamber. Formed about the upper bag portion are a series of tubular gas passages designed and configured to receive pressurized gas from the ECS such that when the tubular gas